Capital Structure is the combination of all the long-term sources of finances. Capital structure theories relate the capital structure of firm, capital mix and value of the firm; basically, capital structure theories relate financial leverage with value of the firm. There are four widely accepted theories on capital structure:

- 1. Net Income Approach
- 2. Net Operating Income Approach
- 3. Traditional Theory Approach
- 4. Modigliani-Miller Approach

Some of the solved numerical problems of capital structure theories are presented below with solutions to have a better understanding on the theories.

NET INCOME APPROACH

Example 1

J & J Limited is assuming an annual EBIT of Rs. 3,00,000. The Company has Rs. 6,00,000 of 10% debentures. The cost of equity capital or capitalization rate is 12.5%. Compute the value of the firm.

Solution:

Net Income	Rs. 3,00,000
Less: Interest on 10% Debenture of Rs. 6,00,000	Rs. 60,000
Earnings available to equity shareholders	Rs. 2,40,000
Market Capitalization Rate	12.5%
Market Value of the Equity (S) = 2,40,000/12.5	Rs. 19,20,000
Market Value of Debenture (D)	Rs. 6,00,000
Answer: Value of the Firm (S+D)	**Rs. 25,20,000**

Example 2

A company expects a net income of Rs. 5,00,000. It has Rs. 2,50,000, 10 % debentures. The equity capitalization rate of the company is 12.5%. Calculate the value of the firm and overall capitalization rate according to the Net Income Approach (ignoring tax).

(a) If the debenture debt increased to Rs. 3,00,000, what shall be the value of the firm and the overall capitalization rate?

Solution:

Net Income	Rs. 5,00,000
Less: Interest on 10% Debenture of Rs. 2,50,000	Rs. 25,000
Earnings available to equity shareholders	**Rs. 4,75,000**
Market Capitalization Rate	12.5%
Market Value of the Equity (S) = 4,75,000*	Rs. 38,00,000
Market Value of Debenture (D)	Rs. 2,50,000
Value of the Firm (S+D)	**Rs. 40,50,000**

Overall Cost of Capital (Ko)

5,00,000/40,50,000

= 12.34%

a.

Net Income	Rs. 5,00,000
Less: Interest on 10% Debenture of Rs. 3,00,000	Rs. 30,000

Earnings available to equity shareholders	**Rs. 4,70,000**
Market Capitalization Rate	12.5%
Market Value of the Equity (S) = 4,70,000*	Rs. 37,60,000
Market Value of Debenture (D)	Rs. 3,00,000
Value of the Firm (S+D)	**Rs. 40,60,000**

Overall Cost of Capital (Ko) = 12.31%

It is clear that addition of debt to the capital mix has decreased the overall cost of capital increasing the value of the firm

NET OPERATING INCOME (NOI) APPROACH

Example 1

A textile company expects the Net Operating Income of is Rs. 3,00,000. It has debenture lending of Rs 5,00,000 at 12% interest payable. The overall capitalization rate is 15%. Calculate the value of the firm and the equity capitalization rate as per the NOI approach.

What will be the impact on value of the firm and equity capitalization firm if the debenture amount is increased to Rs. 6,50,000?

Solution

Net Operating Income	Rs. 3,00,000
Interest	Rs. 60,000
Capitalization Rate	15%
Value of the firm = EBIT/Ko	3,00,000/.15 = Rs. 20,00,000

Equity Capitalization Rate =(EBIT-I)/(V-D)

= (3,00,000-60,000) / (20,00,000-5,00,000)

=2,40,000/15,00,000

= 16%

If the debenture amount is increased,

Value of the Firm = EBIT/Ko = 3,00,000/0.15 = Rs. 20,00,000

Equity Capitalization Rate = (EBIT-I)/(V-D)

= (3,00,000-78,000)/ (20,00,000-6,50,000)

=2,22,000/13,50,000

= 16.44%

Here, the value of firm is irrespective of the capital mix. The benefit of adding the debt fund of Rs. 1,50,000 is nullified by the increase in equity Capitalization rate from 16% to 16.44%.

Traditional Theory Approach

Example 1

Compute the value of the firm, value of shares and average cost of capital from the following information**:**

Net Operating Income	Rs. 2,00,000
Total investment	Rs. 10,00,000

equity capitalization rate, if:

i.	Firm uses no debt	10%
ii.	Firm uses Rs. 4,00,000 as debt	11%
iii.	Firm uses Rs. 6,00,000 as debt	15%

Assume that Rs. 4,00,000 debts can be raised at 5% and Rs. 6,00,000 can be raised at 7% rate of Interest.

Solution:

	No Debt I	**Rs. 4,00,000 @ 5%** II	**Rs. 6,00,000 @ 7%** III
Net Operating income	2,00,000	2,00,000	2,00,000
Interest	–	20,000	42,000
Earning available to shareholders (A)	2,00,000	1,80,000	1,58,000
Equity Capitalization Rate	10%	11%	15%
Market value of Equity Shares	20,00,000	16,36,363	10,53,333
Market Value of Firm (B)	20,00,000	20,36,363	16,53,333
Average Cost of Capital (Earning/Value of the Firm) (A)/(B)	**10%**	**9.82%**	**12.09%**

From the solution above, we can conclude that the increasing the debt portion, over a certain limit, has increased the cost of capital eventually.

MODIGLIANI-MILLER (MM) APPROACH

Example 1

Firm A and B are two similar businesses with similar business risks. Company A is unlevered whereas Company B is levered with Rs. 2,00,000 debenture @ 5% interest rates. Both the companies earn Rs. 50,000 before tax income. The after-tax capitalization rate is 10% and the corporate tax-rate is 40%. Calculate the market value of two firms.

Solutions:

	Firm A	**Firm B**
Net Operating Income (NOI)	50,000	50,000
Interest on debenture	–	10,000
Profit before taxes	50,000	40,000
Taxes (40%)	20,000	16,000
Profit after taxes	30,000	24,000

After-tax Capitalization Rate	10%	10%
Total market value of the equity(S)	3,00,000	2,40,000
Market value of debt (B)	–	2,00,000
Total Value (V)	**3,00,000**	**4,40,000**

Example 2
Company A and B are engaged in the same line of activity with similar business risk. Company A is unlevered, and Company B is levered with Rs. 2,00,000 debentures carrying 5% rate of interest. Both the firms have income before interest and taxes of Rs. 50,000. The Company's tax rate is 40% and capitalization rate 10% for purely equity firms. Compute the value of firm unlevered and leverd using the NI and NOI approach.
Solution:

Under NI Approach

	Company A	**Company B**
Net Income	50,000	50,000
Interest on debenture	–	10,000
Profit before taxes	50,000	40,000
Taxes (40%)	20,000	16,000
Profit after taxes	30,000	24,000
After-tax Capitalization Rate	10%	10%
Total market value of the equity(S)	3,00,000	2,40,000
Market value of debt (B)	–	2,00,000
Total Value (V)	**3,00,000**	**4,40,000**

Under NOI Approach (Taxes are under consideration)
Value of unlevered Firm (Vu) = [EBIT (1-Tc)]/Ke = [50,000*(1-0.4)]/0.10
=Rs. 3,00,000
Value of levered Firm (VL) = Rs. 3,00,000+ Rs. 2,00,000*0.40
= Rs. 3,80,000

Example 3

Company A and B are homogeneous in all respects except that Company A is levered while Company B is unlevered. Company A has Rs. 5,00,000 assumptions are met, and the tax rate is 50%. (3). EBIT is Rs. 50,000 and that equity-capitalization rate for Company B is 12%. What would be the value for each firm according to M— M's approach?

Solution:

Value of unlevered Firm (Vu) = [EBIT (1-Tc)]/Ke = [50,000*(1-0.5)]/0.12
=Rs. 2,08,333

Value of levered Firm (VL) = Rs. 2,08,333+ Rs. 5,00,000*0.50
= Rs. 4,58,33